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ADVANCED COMPRESSORS AND EXPANDERS FOR FUEL CELL APPLICATIONS

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Abstract

Fuel Cell Power Systems (FCPS) are currently being developed by many companies around the world to power future electric vehicles.

Each system under development is taking a slightly different approach.

All have a common need for an efficient, flexible compressed air supply.

Energy recovery components are highly desirable to minimize power drawn from the fuel cell stack to operate the compressor.

No appropriate products currently exist.

VAIREX patented variable displacement compressor technology has operational characteristics that can meet the need of FCPS air systems.

An early demonstration of the concept showed much promise and has resulted in a contract with the DOE to develop a Variable Displacement Compressor / Expander (VDCE™).

This current phase will result in an air system with independent control of air mass flow and pressure over the entire operating regime.

Significant improvements in volume, weight and pressure ratio from the initial demonstrator have been made and are reported in this paper.

By the end of this phase, improvements will have been made in energy recovery and the development of a control strategy for an advanced air management system that supports myriad fuel cell power systems.